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## Two New Anophthalmic *Trechiana* (Coleoptera, Trechinae) Found in Non-calcareous Areas of Central Japan<sup>1)</sup>

By

**Shun-Ichi UÉNO**

Department of Zoology, National Science Museum, Tokyo

In the present paper, I am going to describe two new anophthalmic trechine beetles belonging to the genus *Trechiana*, which were recently discovered in the subterranean environment of non-calcareous areas at the northern part of the Kinki District in Central Japan. Both the new species belong to the group of *Trechiana oni* and are related to *T. kosugei* S. UÉNO (1955, p. 33, fig. 3, 1959, pp. 30, 31; JEANNEL, 1962, pp. 196, 197), an endogean trechine known from Magura near Maizuru in Kyoto Prefecture. One of the two species was found in a natural cave lying in serpentinized dunite, and the other in several adits of silicestone mines.

The discovery of these trechine beetles is important in several respects. They are so similar to *T. kosugei* in habitus that it is difficult to recognize them as valid species on the external morphology alone. And yet, there is a remarkable — almost incredible — differentiation in their male genitalia, which includes the development of a copulatory piece in the new species, though such a sclerite is usually absent in the members of the group of *T. oni*. This is a sure indication that the presence or absence of copulatory piece(s) does not serve by itself a key character for the classification of higher categories of East Asian trechines.

Zoogeographically, these new species are useful for filling a large blank in our knowledge of the distributional range of the group of *T. oni*. This blank was filled to a certain extent by the discovery of *T. crassilobatus* in the abandoned copper mines of To-no-miné Hill (cf. UÉNO, 1977), but the present findings are more important because the localities of the new species are interlaced with those of the members of the group of *T. ohshimai*. I have no intention to discuss the matter in full detail at this place, but the known localities of *T. yoshiakii* sp. nov. are strangely interwoven with those of *T. ohshimai*, as will be illustrated in my forthcoming revision of the latter group.

Three other populations of trechine beetles belonging to the same species-group have been known in the Chûgoku Hills and northeastern Shikoku. Because of the inadequacy of available materials, however, I have been unable to determine them with confidence and refrained from including them in the present paper.

The abbreviations used in this paper are as follows: HW — greatest width of head;

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PW — greatest width of pronotum; PL — length of pronotum, measured along the mid-line; PA — width of pronotal apex; PB — width of pronotal base; EW — greatest width of elytra; EL — greatest length of elytra; M — arithmetic mean.

Before going into further details, I have to thank Mr. Yoshiaki NISHIKAWA of Otomon Gakuin University, Osaka. But for his friendly help, this study could never have been completed. Deep gratitude is also due to Dr. Riozo YOSHII for furnishing useful information, to Mr. Soichi KOBAYASHI for giving permission to investigate the mine adits under his management, and to Messrs. Kôjirô KATSURA, Ichiro KOJIMA, Kazuo MORI, Akira NOTO, Yuzo TARUMI and Toshihiko YOSHIMURA for supplying with additional materials.

*Trechiana* (s. str.) *shuten* S. UÉNO, sp. nov.

[Japanese name: Shuten-mekura-chibigomimushi]

(Figs. 1–4)

Length: 5.10–6.00 mm (from apical margin of clypeus to apices of elytra).

Externally very similar to *T. kosugei*, with which it agrees in every detail except for the shorter elytra with distinct shoulders and deeper striae. Strikingly different from the endogean species in the structure of male genitalia, above all in the conformation of apical lobe and apical orifice, in having a large copulatory piece inside the inner sac, and in the shape of styles.

Colour light reddish brown, paler than in *T. kosugei*, shiny, and faintly iridescent on elytra; palpi, apical segments of antennae, ventral surface of hind body, and legs light yellowish brown.

Head small, square and depressed above, with frontal furrows deep, moderately arcuate and not angulate; microsculpture distinct, mostly consisting of fine transverse reticulation; eyes vestigial and not faceted, though their trace is obvious; genae gently convex; labrum transverse, with the apical margin deeply emarginate though nearly straight at middle; mandibles fairly long, sharply hooked at apices; mentum tooth porrect and bifid; palpi thin; antennae slender, usually reaching apical three-eighths of elytra though the length is variable to some extent according to individuals, with segment 2 about four-sevenths as long as segment 3, which is slightly longer than segment 4, apical segments cylindrical, 7–9 each 3.5–4 times as long as wide, terminal segment about as long as segment 7 or 8, much longer than scape but shorter than segment 3.

Pronotum cordate, much wider than head, a little wider than long, widest at about two-thirds from base, and equally contracted in front and behind; PW/HW 1.37–1.42 (M 1.40) [1.38 in *T. kosugei*], PW/PL 1.05–1.11 (M 1.08) [1.04–1.10 in *T. kosugei*], PW/PA 1.43–1.52 (M 1.45) [1.43–1.47 in *T. kosugei*], PW/PB 1.41–1.51 (M 1.45) [1.41–1.44 in *T. kosugei*]; surface convex, with vague transverse striations; microsculpture composed of fine transverse lines though partially degenerated; sides strongly and evenly arcuate in front, deeply sinuate usually at about one-fifth from base,

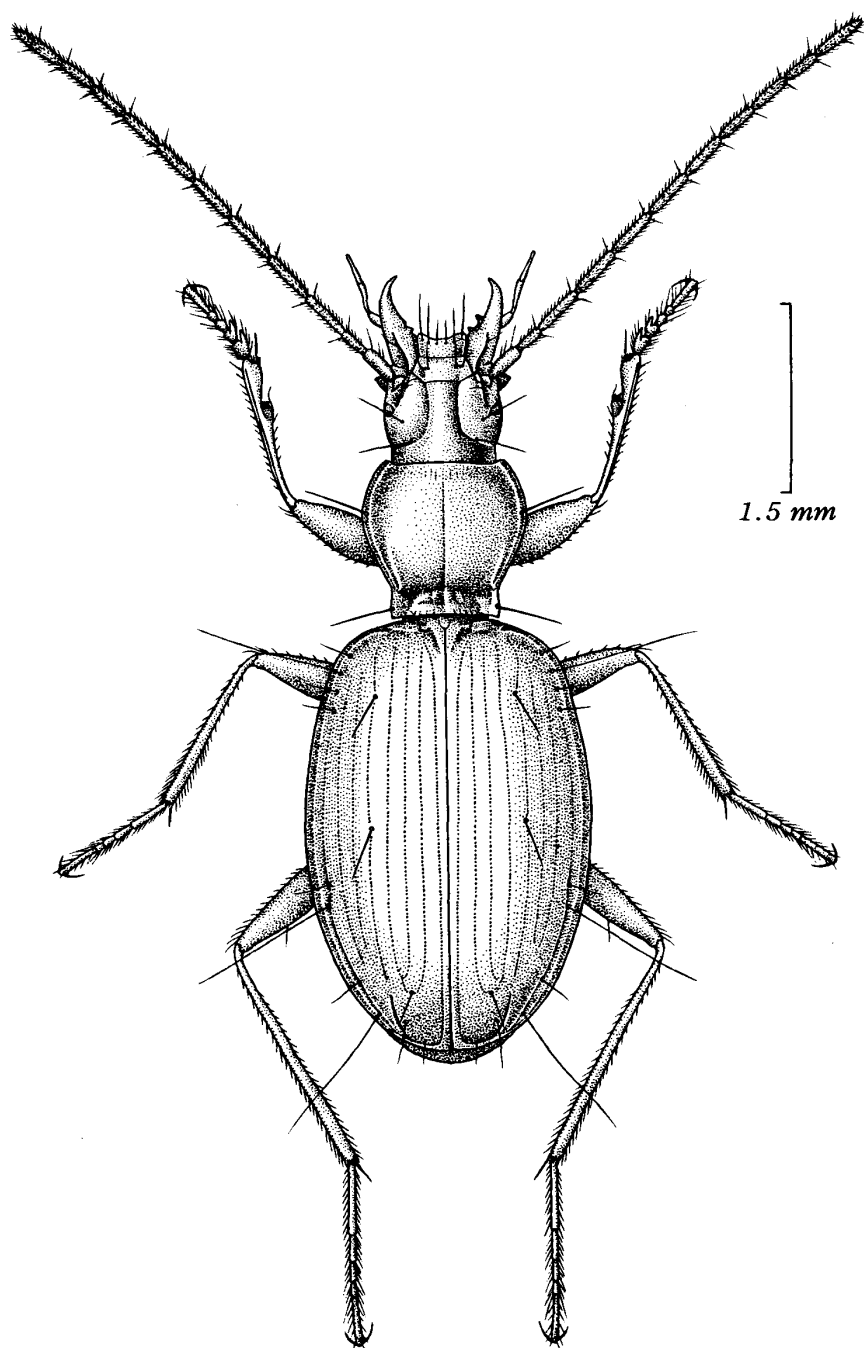


Fig. 1. *Trechiana* (s. str.) *shuten* S. UÉNO, sp. nov., ♂, from Oni-no-iwaya Cave of Mt. Ôé-yama.

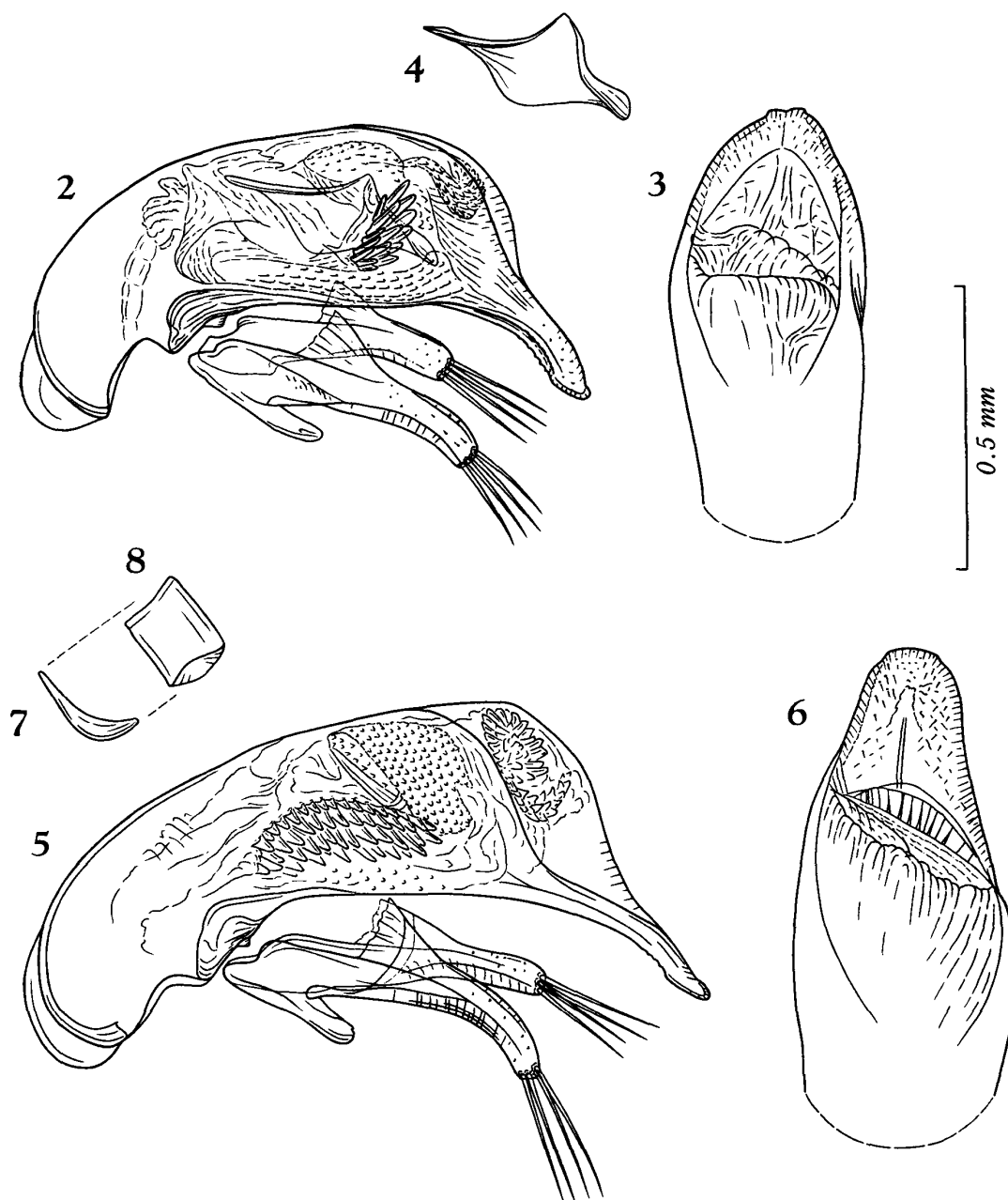
and then more or less divergent again towards sharp hind angles, which are more or less produced postero-laterad; the position of ante-basal sinuation varies between basal one-sixth and two-ninths; both lateral and postangular setae present, the latter being distant from hind angle; apex about as wide as base, PB/PA 0.96–1.07 (M 1.00) [1.01–

1.02 in *T. kosugei*], with front angles distinct though not much produced; base either slightly emarginate or almost straight at middle; median line distinct, obviously widening and deepening at the basal part; apical transverse impression shallow though indicated by longitudinal wrinkles; basal transverse impression deep, laterally merging into basal foveae which are not particularly large but deep; postangular carinae long and prominent; basal area uneven.

Elytra elongated ovate, widest at about middle, and more pointed at apices than at bases, with ample basal part; EW/PW 1.63–1.77 (M 1.71) [1.70–1.79 in *T. kosugei*], EL/EW 1.50–1.55 (M 1.53) [1.57–1.60 in *T. kosugei*]; surface moderately convex though depressed on the disc; microsculpture composed of fine transverse lines though largely degenerated; shoulders distinct, rather narrowly rounded, with prehumeral borders nearly straight and not so oblique; sides moderately reflexed, gently arcuate at middle, and hardly emarginate before apices, which are almost conjointly rounded though frequently forming a small re-entrant angle at suture; striae entire, weakly crenulate, moderately impressed on the disc but becoming shallower at the side, stria 8 more or less deepening at the apical part; scutellar striole distinct though rather short; apical striole deep, not much curved, usually joining or directed to stria 5 but sometimes joining stria 7; intervals smooth, somewhat convex near suture but flat at the side; apical carina obtuse; no setiferous dorsal pore on stria 3; preapical pore situated at the apical anastomosis of striae 2 and 3, being more widely distant from apex than from suture; stria 5 with two setiferous dorsal pores at  $1/6-1/5$  and  $1/2-3/5$  from base respectively; marginal umbilicate pores aggregated and regular.

Ventral surface smooth; sexual setae on anal sternite normal in number. Legs long and slender; protibia straight, deeply grooved on the external face and glabrous on the anterior face even at the apical part; in ♂, two proximal segments of each protarsus widely dilated and stoutly produced inwards at apices.

Male genital organ very small though heavily sclerotized, decisively differing from that of *T. kosugei*, especially in the shape of aedeagal apical part and in having a large copulatory piece inside the inner sac. Aedeagus only two-sevenths as long as elytra, short and robust, hardly arcuate at middle, and not particularly asymmetric at the apical orifice; basal part small, only feebly curved, and provided with moderately developed sagittal aileron; basal orifice small, though deeply emarginate at the sides; viewed dorsally, apical lobe very broad and rather abruptly narrowed from near the extremity, which is very briefly produced and subtruncated; viewed laterally, apical lobe very thick, obliquely produced ventrad, gently arcuate, and longitudinally concave on the ventral face, the lateral edges of this concavity being distinctly indented; apex obtusely keeled on the median line of the ventral surface behind the longitudinal concavity. Inner sac scaly though the scales are hardly sclerotized, and armed with a well differentiated copulatory piece and two groups of heavily sclerotized teeth; copulatory piece large, somewhat spatulate and twisted; of the two groups of sclerotized teeth, the left lateral one consists of rather a small number of very large teeth, while the right apical one consists of much smaller teeth. Styles broad, left style being much



Figs. 2-8. Male genitalia of *Trechiana* (s. str.) spp.; left lateral view (2, 5), apical part of aedeagus, dorsal view (3, 6), separated copulatory piece, left lateral view (4, 7), and the same, caudal view (8). — 2-4. *T. (s. str.) shuten* S. UÉNO, sp. nov., from Oni-no-iwaya Cave of Mt. Ôé-yama. — 5-8. *T. (s. str.) yoshiakii* S. UÉNO, sp. nov., from Tengan Mine in Taki-chô.

longer than the right, each provided with four setae at apex.

*Type-series.* Holotype: ♂, allotype: ♀ (25-X-1977, Y. NISHIKAWA leg.). Paratypes: 1 ♂, 4 ♀♀ (25-X-1977, Y. NISHIKAWA leg.); 1 ♂ (20-XI-1977, Y. NISHIKAWA

leg.); 1 ♂, 1 ♀ (23-IX-1978, K. MORI & Y. TARUMI leg.). All deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo.

*Type-locality.* Oni-no-iwaya Cave, on the northeastern ridge of Mt. Ôé-yama in Kaya-chô of Kyoto Prefecture, central Honshu, Japan.

*Notes.* Oni-no-iwaya Cave, the type-locality of the present species, is quite unique in that it is developed in serpentinized dunite. Though not particularly rare, this kind of rock has never been known to embrace natural caves. It is situated on the northeastern ridge of Mt. Ôé-yama at an elevation of about 680 m, and is about 3.7 km removed from the highest point of the mountain. In a bee-line, it is only 19 km distant to the west-northwest from Magura, the type-locality of *T. kosugei*, but is on the opposite side of the valley of the Yura-gawa River, which may have served for a barrier between the territory of *T. shuten* and that of *T. kosugei*.

The entrance to the cave is small, opening among rocks and leading down to the room on the first level. At a corner of this room, there is a very tight hole, which drops into the room at the lowest level. Being fed by trickling water, this recess is the most humid of the whole cave, and besides, fairly rich in organic material. Trechine beetles have been found only in this lowest room, from under stones and rotten logs lying on the muddy floor.

Every Japanese knows a famous legend that there was once upon a time an ogre called Shuten-dôji, who haunted the old capital to snatch precious things and to kidnap pretty girls. He was believed to live in Oni-no-iwaya or the Cave of Ogre in the heart of Mt. Ôé-yama. As it has now become apparent that the only inhabitant endemic to the cave is the trechine beetle described above, I think it appropriate to name the new species after the ogre and to call it *Trechiana shuten*.

***Trechiana* (s. str.) *yoshiakii* S. UÉNO, sp. nov.**

[Japanese name: Tengan-mekura-chibigomimushi]

(Figs. 5-8)

Length: 5.00-6.15 mm (from apical margin of clypeus to apices of elytra).

Externally very similar to the preceding species and confidently distinguished from that species only by genitalic characters, but the colour is generally darker, the pronotum is usually a little wider at the base, and the elytra are more convex at the sides and have less prominent shoulders. From *T. kosugei*, the present species can be barely discriminated by the shorter elytra with deeper striae. Decisively different from the two congeners in the structure of male genitalia as will be described later.

Colour reddish brown to dark reddish brown, shiny, more or less iridescent on elytra; palpi, apical segments of antennae, ventral surface of hind body, and legs more or less lighter than dorsum.

Head as in the preceding species; antennae usually reaching apical two-fifths of elytra though the length is variable to some extent according to individuals. Pronotum as in the preceding species though usually a little wider at base and with less

distinctly marked front angles; PW/HW 1.39–1.48 (M 1.43), PW/PL 1.05–1.16 (M 1.11), PW/PA 1.39–1.56 (M 1.49), PW/PB 1.35–1.51 (M 1.43), PB/PA 0.98–1.12 (M 1.04); ante-basal sinuation of each lateral side usually situated at about two-ninths from base, though variable to some extent according to individuals. Elytra also similar to those in *T. shuten*, but more strongly convex at the sides; EW/PW 1.58–1.74 (M 1.67), EL/EW 1.46–1.57 (M 1.52); shoulders obviously less prominent, with oblique prehumeral borders (similar in these respects to those of *T. kosugei*); striae rather deeply impressed on the disc though becoming shallower at the side. Legs somewhat stouter than those in *T. shuten*.

Male genital organ relatively large and heavily sclerotized, markedly differing in details from those of *T. shuten* and *T. kosugei*, though it is closer to the latter than to the former. Aedeagus fully one-third as long as elytra, robust, fairly elongate, and gradually dilated towards apical orifice, which is obviously asymmetric and is more widely open to the left side than to the right; basal part fairly elongate though hardly curved ventrad; basal orifice deeply emarginate at the sides; sagittal aileron moderately developed though narrow; viewed dorsally, apical lobe long, fairly broad to near the extremity though gradually narrowed apicad, and subtruncated at the tip; viewed laterally, apical lobe fairly thick, obliquely produced ventrad, and gently arcuate; ventral surface of apical lobe similar in structure to that in *T. shuten*, but both the serrated edges of the ventral concavity and the apical median keel are obtuse. Inner sac scaly and armed with a small copulatory piece and two patches of heavily sclerotized teeth; copulatory piece oblong and reflexed, being situated at the anterior side of the scaly portion of inner sac; left lateral patch of sclerotized teeth obviously larger than that in *T. shuten* and composed of larger number of large teeth; right apical patch also large, though consisting of rather small teeth. Styles fairly slender, left style longer than the right, each usually provided with four setae at apex, though the number of the apical setae varies from three to five.

*Type-series.* Holotype: ♂, allotype: ♀ (Tengan Mine — adit No. 11, 26–III–1978, S. UÉNO leg.). Paratypes: 3 ♂♂, 3 ♀♀ (Tengan Mine — adit No. 10, 7–XI–1977, Y. NISHIKAWA leg.); 5 ♂♂, 9 ♀♀ (Tengan Mine — adit No. 11, 26–III–1978, S. UÉNO & Y. NISHIKAWA leg.); 2 ♂♂, 1 ♀ (Tengan Mine — adit No. 10, 17–IX–1978, Y. NISHIKAWA leg.); 2 ♂♂, 3 ♀♀ (Shinden Mine — adit No. 6, 26–III–1978, S. UÉNO & Y. NISHIKAWA leg.); 6 ♂♂, 4 ♀♀ (Shinden Mine — adit No. 6, 17–IX–1978, Y. NISHIKAWA, K. KATSURA, I. KOJIMA, Y. TARUMI, A. NOTO & K. MORI leg.).

All the specimens of the type-series are deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo.

*Further specimens examined.* 5 ♂♂, 2 ♀♀ (Tanba Mine — adit 310M of Ohtawa No. 8, 17–IX–1978, Y. NISHIKAWA, K. KATSURA & I. KOJIMA leg.) (NSMT).

*Localities.* Tengan Mine (adits Nos. 10 & 11) (type-locality!) and Shinden Mine (adit No. 6), both at Shinden of Kamisasami in Taki-chô; and Tanba Mine (adit 310M of Ohtawa No. 8), at Hatayamanotsubo of Hiuchiwan in Sasayama-chô; all in Hyôgo Prefecture of central Honshu, Japan.

*Notes.* Judging from the structure of its male genitalia, this new species seems closer to *T. kosugei* than to *T. shuten*. This can be inferred from the fact that in both *T. yoshiakii* and *T. kosugei*, the apical orifice is remarkably asymmetric due to the reduction of the left wall, that the apical lobe is gradually narrowed from the base to the apex, and that the left lateral patch of sclerotized teeth is elongate and lies at a proximal position of the inner sac. In the present species, however, the aedeagus is obviously more elongate than that of *T. kosugei*, the apical lobe is relatively wide even near the apex, which is devoid of terminal tubercle, and the inner sac bears a small but well sclerotized copulatory piece.

The type-locality of *T. yoshiakii* is more than 30 km distant to the south from that of *T. kosugei* and belongs to a different drainage system; and yet, the differentiation between these two species is not so pronounced as that between *T. kosugei* and *T. shuten*. Perhaps *T. shuten* was first isolated from the common ancestor of the three species under consideration, and then, the latter which still had rather a wide range at the northern part of the eastern Chûgoku Hills, became differentiated into *T. yoshiakii* and *T. kosugei*. As was already noted, the localities of these trechine beetles are strangely interwoven with those of the members of *T. ohshimai*. This probably helped the progress of speciation between the two species belonging to the group of *T. oni*.

The present species has been known from three mines of silicestone, two of which, including the type-locality, are situated along the upper stream of the Sasami-gawa River and the remaining one is in the drainage of the Hata-gawa River. Both the rivers are the tributaries of the Sasayama-gawa, which empties into the Inland Sea of Seto-naikai.

Tengan Mine, the type-locality, is dug into the beautiful akashiro silicestone lying on the left side of the Sasami-gawa River at an elevation of about 290 m. There are several horizontal adits of the mine, all of which are connected by shafts. The adit No. 11 is the lowest and is connected with the adit No. 10 by a steep passage. Trechine beetles were first met with by NISHIKAWA in the adit No. 10, always around rotten logs previously used for mine posts and abandoned in damp corners. Accompanied by him, I paid a visit to the mine and collected the beetles in the adit No. 11. At the central part of this adit, there was a well covered with boards, with muddy edges all round. The beetles were found from under the boards and were very active when exposed.

The second locality of the new trechine is an abandoned adit (No. 6) of Shinden Mine, which lies on the opposite side of the Sasami-gawa River. The adit is nearly horizontal and is damp throughout. Trechine beetles were found from near the entrance to the innermost, but most of the known specimens were taken from under rotten logs abandoned on a shelf near the end of the adit.

The other locality, Tanba Mine, lies on the left side of the Hata-gawa River at an elevation of about 310 m, and is about 3.5 km distant to the west from the type-locality. Like Tengan Mine, this silicestone mine also consists of several adits connected by shafts. Trechine beetles were found in a debris under a shaft in the adit



310M, and also in another adit about 50 m north of the adit 310M. The standard ratios of body parts in the Tanba Mine population are as follows: PW/HW 1.43–1.51 (M 1.46), PW/PL 1.08–1.13 (M 1.11), PW/PA 1.48–1.52 (M 1.51), PW/PB 1.40–1.51 (M 1.45), PB/PA 1.00–1.07 (M 1.04), EW/PW 1.61–1.68 (M 1.65), EL/EW 1.47–1.56 (M 1.51).

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